Illinois River Upland and In-stream Phosphorus Modeling

FINAL REPORT

Submitted to

Oklahoma Department of Environmental Quality
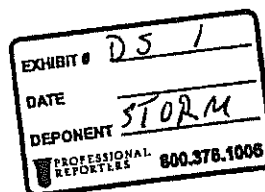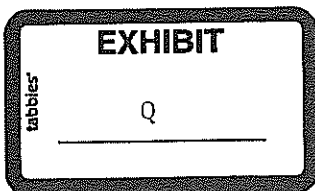
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EXHIBIT

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EXHIBIT # DS 1
DATE
DEPONENT STORM
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$$ICAP\,Mehlich\,III\,P(1:10) \;=\; 1.11\;Colormetric\,Mehlich\,III\,P(1:10) \;+\; 26.7$$

where Mehlich III is in mg/l.

Row Crop/Small Grains STP

STP data for row crop and small grains were gathered from the Oklahoma State University Soil, Water & Forage Analytical Laboratory (1-1993 to11-2001) and the University of Arkansas Soil Testing and Researching Laboratory (8-2000 to 8-2002). Averages by region are shown in Figure 3.1.

Poultry House Data

House Locations

Poultry house locations in the basin were tagged from Digital Orthographic Quads with a resolution of 1 meter. This method locates both active and many standing but inactive houses. The fraction of active to inactive houses for the Arkansas side was estimated using data from the real estate assessor's office in Benton County, Arkansas (Benton County 71%, Washington County 43%). An estimate for the Oklahoma side was made using 1995 production data (DOQQs for Oklahoma were also 1995) obtained from Jim Britton (OSU Cooperative Extension poultry specialist) for Adair county (71%). This fraction was applied to the entire Oklahoma side of the Illinois River basin. Without specific information about which houses were active/inactive we assumed that litter was produced at every house, and adjusted the litter production to reflect the active/inactive fraction for that county.

Litter Production

Poultry houses vary in capacity and contain different types of birds which produce litter of differing mass and nutrient content. The Oklahoma Department of Agriculture Food and Forestry Licensed Poultry Operators Database was used to estimate the number and type of birds produced in the Oklahoma portion of the basin. These estimates were also applied to the Arkansas side of the basin. This database required significant work to remove duplicate records, a product of the way in which this database was constructed. The database was not used to determine poultry house locations for this reason among others. Litter produced per animal was derived from *Poultry Waste: Georgia's 50 Million Dollar Forgotten Crop*, http://www.ces.uga.edu/pubcd/L206-w.html. We estimated that 124 tons of litter was produced at each active house, which was adjusted to account for the fraction of inactive houses in each county. Nutrient content of the litter was estimated to be 1% mineral nitrogen, 4% organic nitrogen, 0.4% mineral phosphorus, and 1% organic phosphorus. Nutrient content was based on the distribution of bird types given in the Oklahoma Department of Agriculture Food and Forestry Licensed Poultry Operators Database and nutrient content of each type of litter in the SWAT 2000 fertilizer database. We estimated that a total of 231,000 tons (210,000,000 kg) of litter were produced in the Illinois River basin each year. Based on our estimates, the litter contained 10,400,000 kg nitrogen and 2,930,000 kg phosphorus.

Pasture Litter Application

Detailed litter application rates and STP were very important when predicting phosphorus loads from pastures. This information was not readily available for the Illinois River basin. We can make good estimates of the total litter produced in the basin, and know where it was produced, but not where it was applied. Litter was expensive to transport relative to its value and it was, therefore, not economical to transport it very far from where it was produced. We assumed that litter was

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